ARIZONA MINING ASSOCIATION

SCIENCE AND TECHNICAL COMMENTS

OF

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TO

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

ON ARIZONA HAZARDOUS AIR POLLUTANT RULEMAKING

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1. INTRODUCTION

Weston Solutions, Inc. (Weston), a contractor hired by the Arizona Department of Environmental Quality (ADEQ), developed a document entitled, "Procedure for Air Quality Dispersion Modeling for the Arizona HAPRACT Rule," dated July 5, 2005 (Proposal). This document was prepared as part of a stakeholder process for developing Arizona Hazardous Air Pollutants rules (state HAPs rules). The ADEQ Director is considering using the Proposal to predict human exposure to source specific HAP emissions. The ADEQ Director must find "emissions of hazardous air pollutants from sources in the category [proposed for listing] individually or in the aggregate result in adverse effects to human health or adverse environmental effects." A.R.S. §49-426.05(A).[1] If the ADEQ Director cannot make this finding, then he is not authorized to designate or list a source category for purposes of the state HAPs rule. *Id*. On behalf of the Arizona Mining Association (AMA), I reviewed this Proposal to determine whether it is scientifically valid and would support the ADEQ Director's finding.

The statutory finding the Director must make to designate a source category includes the phrase "result in adverse effects." The statutory language does not state, "potentially result in adverse effects," or "result in a risk of adverse effects." Also, the statutory language refers to "emissions of hazardous pollutants from sources." It does not refer to potential, hypothetical, or assumed emissions. Nor does it refer to hypothetical sources or assumed source characteristics. The statutory language is grounded firmly in reality. In contrast, the Proposal states, "the document also addresses the procedures to be followed to model the facilities to determine their *potential* impacts on the surrounding communities." Proposal, p.1 (emphasis added). The analysis in this Report presumes the specific language selected by the Legislature is meaningful and controlling.

As described in this Report, the Proposal adds conservatism upon conservatism, resulting in a methodology that is overly conservative. As described in this Report, the Proposal predicts source specific HAP emission air concentrations up to 1,000 to 60,000 times actual human exposure (**Figure 1-1**). The Proposal's use of a 120% factor to mitigate conservatism is insufficient. The proposed overly conservative methodology does not provide a reasonable basis for the ADEQ Director to find "emissions of hazardous air pollutants from sources in the category [proposed for listing] individually or in the aggregate result in adverse effects to human health or adverse environmental effects."

[1] The scope of work for this Report did not include review of Weston's separate proposals for determining adverse effects to human health.

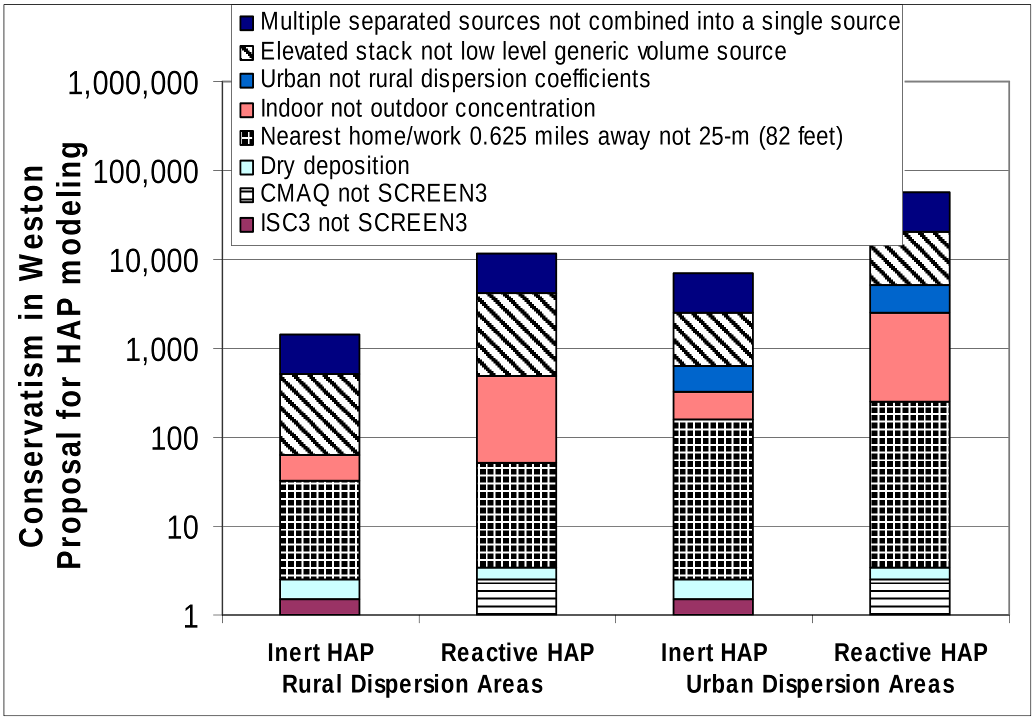

Figure 1-1. Estimated conservatism in Proposal modeling method.

2. ANALYSIS OF WESTON'S PROPOSED MODELING METHODOLOGY

2.1 WESTON'S USE OF THE EPA SCREEN3 MODEL FOR HAP PREDICTIONS IS NOT CONSISTENT WITH EPA GUIDANCE. FOR INERT HAPS, THE EPA SCREEN3 MODEL IS 54% MORE CONSERVATIVE THAN THE EPA RECOMMENDED USE OF ISC3.

Weston proposes using the conservative EPA SCREEN3 model to estimate outdoor HAP concentrations. The Proposal says this approach follows both EPA air quality modeling guidelines (EPA, 1996) and ADEQ modeling guidance (ADEQ, 2004). The referenced EPA (1996) modeling guideline is out-of-date. The current EPA (2003) (40 CFR Ch. I, p. 453.) guideline "recommends air quality modeling techniques that should be applied to State Implementation Plan (SIP) revisions for existing sources and to new source reviews (NSR), including prevention of significant deterioration (PSD). (See Ref. 1, 2, 3). Applicable only to criteria air pollutants, it is intended for use by EPA Regional Offices in judging the adequacy of modeling analyses performed by EPA, State and local agencies and by industry." HAPs are not criteria air pollutants.

The Proposal does not consider using any of the seven dispersion models that EPA has stated should be considered for estimating outdoor concentrations for exposure modeling. The seven models are CMAQ (for reactive species); ISC, ASPEN (large scale domains, such as the entire U.S.) and AERMOD (for urban plumes; short and long-term); and Caline and CAL3QHC (for roadways) (EPA, 2005b). EPA's recommendations do not include the SCREEN3 model used in the Proposal. The Proposal does not explain why SCREEN3 was selected instead of one or more of these models.

ISC3 is an EPA guideline model recommended for HAP modeling (EPA, 2005b). Comparing inert HAP model concentration predictions by SCREEN3 and ISC3 for rural and urban dispersion coefficients will show conservatism in SCREEN3. To compare the models, ISC3 was run using an ADEQ ISC meteorological file consisting of 1991 Phoenix Sky Harbor airport surface and 1991 Tucson airport upper air data. The modeling used HAP emissions source characteristic reflecting the Weston generic volume source 2-story (24-foot high, 100-foot long) building. This surrogate source has the following characteristics: the HAP emissions release is 12 feet (3.66 m) above ground; the initial lateral and vertical dimensions are σ_{yo} at 23.4 feet (100/4.3 or 7.1 m) and σ_{zo} at 11.2 feet (24/2.15 or 3.4 m); and HAP concentrations were calculated at the Weston default 25-m process area boundary (PAB).

Table 2-1 lists the maximum 1-hour HAP concentrations predicted by SCREEN3 and ISCST3 for rural and urban dispersion coefficients at 25-m. For both rural and urban areas, the maximum SCREEN3 prediction exceeds the maximum ISCST3 prediction by 54%. In other words, the SCREEN3 prediction is 154% more than the ISC3 prediction.

Table 2-1. Comparison of SCREEN3 and ISCST3 maximum 1-hour predicted concentrations for the ADEQ generic volume source at 25-m for rural and urban dispersion coefficients

DOWNWIND	SCREEN3 (μg/m^3)		ISCST3 (μg/m^3)		SCREEN3/ISCST3	
DISTANCE (M)	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
25	1.0	0.74	0.65	0.48	1.54	1.54

Other state agencies have recognized that screen modeling is not designed to predict actual ambient concentrations of air pollutants. For example, the New Mexico Air Quality Bureau (2002) modeling guidance says “DO NOT PANIC if screening analyses show the facility is exceeding NAAQS or NMAAQS!! In most cases screening analyses are inadequate.” Oklahoma’s Air Quality Division (OAQD) and the Texas Commission on Environmental Quality (TCEQ) published guidance that recognizes that EPA models can be extreme over predictors. TCEQ (2004a) states these over predictions have led to significant use of agency staff, applicants, and the public time. The time used to develop control strategies meant to protect public health and welfare may not have been needed. The OAQD (2003) sums up this issue by stating that because EPA models may over-predict the impact in an analysis, a modeled prediction alone does not mean there will be a condition of an adverse health effect. A prediction is only a flag signaling *potential* issues. OAQD staff may require the source perform more complex modeling or change physical values of the source to reduce ambient impacts. If modeling continues to predict an exceedance, the OAQD may require the source to conduct monitoring. Therefore, as the Oklahoma Air Quality Division aptly concludes, dispersion screen modeling analysis is useful as *information* to reassure the public that a source's permitted emissions *could not possibly cause* an adverse health effect. In contrast, a screen model is not suited to determine whether a source actually “results in” adverse health effects.

2.2 FOR REACTIVE SPECIES WITH DATA, THE EPA SCREEN3 MODEL IS 90% TO 150% MORE CONSERVATIVE THAN THE EPA RECOMMENDED USE OF CMAQ.

EPA recommends using the CMAQ dispersion modeling for estimating outdoor concentrations of reactive HAPs (EPA, 2005b). As CMAQ is an EPA guideline model recommended for HAP modeling, comparing reactive HAP model concentration predictions by SCREEN3 and CMAQ will show any conservatism in SCREEN3 for reactive HAPs with data. For the reactive HAPs benzene and formaldehyde CMAQ produced 70% and 25% lower concentrations than a nonreactive ISC analysis (Ching et al., 2004). As SCREEN3 is about 50% more conservative than ISC3 (see Section 2.1), SCREEN3 is 150% and 90% more conservative for benzene and formaldehyde than CMAQ. Additional data would be needed to identify the conservatism for other reactive HAPs.

Of the seven dispersion models EPA recommends for HAP modeling, only CMAQ (a photochemical grid model) applies to predicting reactive HAP concentrations (EPA, 2005b). Past studies (for example, Texas Commission on Environmental Quality, 2004b) reveal the process from start to finish of obtaining approval of a photochemical ozone modeling analysis involves a calendar year or longer. This means that developing a CMAQ photochemical grid analysis for one HAP will be people and computationally intensive in order to perform a reality-based scientific analysis of reactive HAPs.

2.3 SCREEN3 IS NOT APPROPRIATE FOR MAKING THE FINDING REQUIRED BY THE STATUTE WITH RESPECT TO HAPS THAT HAVE SIGNIFICANT DRY PLUS WET DEPOSITION.

Dry deposition involves pollutant concentration removal from the atmosphere through pollutant uptake or reaction with vegetation, the ground surface, and soil. Wet deposition involves pollutant removal from the atmosphere by precipitation. Gaseous pollutants (for example, benzene) dissolve in, absorb to, or adsorb to precipitation, which deposits onto the earth. As precipitation falls it also captures particle-bound pollutants (for example, cadmium).

EPA guidance states that, when modeling to estimate the actual exposure of people to HAPs with significant dry plus wet deposition, gravitational settling should be included in the model (40 CFR Ch. I (7–1–03 Edition), p. 473). **Table 2-2** lists the ratio of the maximum annual HAP concentrations predicted by ISCST3 for rural dispersion coefficients at 25-m, 50-m and 1000-m with and without including dry deposition. The particle-bound HAP size distribution used was that required by ADEQ for a recent study. From 25-m to 1000-m, the ISC3 predicted that HAP concentration with dry depletion ranges from 70% to 90% of the concentration that is predicted without accounting for dry depletion. In other words, by ignoring dry depletion the SCREEN3 predicted conservatism ranges from 111% to 142% for particle-bound HAPs. Given this finding, it would not be surprising to find similar conservatism for gaseous HAPs and conservatism by omitting precipitation effects (wet deposition).

Table 2-2. Reduction in HAP annual concentrations by accounting for dry deposition. ISCST3 maximum annual predicted concentrations for the ADEQ generic volume source at 25-m, 50-m, and 1000-m for rural dispersion coefficients

DOWNWIND DISTANCE (M)	ISCST3 (with dry deposition)/ ISCST3 (without dry deposition)
25	0.9
50	0.85
1000	0.7

2.4 THE PROPOSAL RELIES ON THE OVERLY CONSERVATIVE ASSUMPTION THAT MEMBERS OF THE PUBLIC REMAIN 25 METERS (82 FEET) FROM A HAP SOURCE.

The Proposal assumes that members of the public are 25 meters (82 feet) from the HAP source. Moreover, the Proposal assumes that the public remains at this close location for 24 hours per day, every day of the year. The Proposal does not cite any data to support this assumption for all or any source categories. The assumption is an additional conservative assumption.

2.5 THE SCREEN3 PREDICTION AT THE 25-M DEFAULT DISTANCE IS GREATER THAN THE MAXIMUM CONCENTRATION PREDICTED FOR A TYPICAL DISTANCE FROM AN EMISSIONS UNIT TO A HOME.

The home is the best single location for estimating constant public human exposure. The Proposal does not rely on the typical distance between a home and an industrial facility's emission units. In the absence of data to the contrary, the Proposal conservatively uses 25 m as the default distance from the emission unit to the point of constant public exposure. In some cases, 25 m would be inside a facility's private property, where no private home would be located. 1000 m (0.625 miles) is a more realistic distance from a generic emissions unit to a generic residence. In urban areas, a generic emissions unit might be closer to a generic residence.

In order to identify the effect of this conservatism in the Proposal, SCREEN3 and ISCT3 were used to predict concentrations at 25 m and at the following distances: 50 m, 100 m, and 1000 m. The modeling was performed with urban and rural dispersion coefficients. **Table 2-3** shows the results of this comparison, illustrating how predicted concentrations decline moving farther away from the emission unit. The Table also shows that the SCREEN3 results are much more conservative than the ISCT3 results.

This comparison shows that the Weston SCREEN3 prediction at 25 m is 1250% (rural) and 8222% (urban) greater than the 1000 m predictions. Similarly, the ISCT3 prediction at 25 m is 1083% (rural) and 5330% (urban) greater than the 1000 m prediction. Finally, the SCREEN3 predictions are 54% greater than the ISCT3 predictions.

Table 2-3. Comparison of SCREEN3 and ISCST3 maximum 1-hour predicted concentrations for rural and urban dispersion coefficients for the generic volume source by downwind distance

DOWNWIND	SCREEN3 ($\mu g/m^3$)		ISCST3 ($\mu g/m^3$)	
DISTANCE (M)	RURAL	URBAN	RURAL	URBAN
25	1.0	0.74	0.65	0.48
50	0.89	0.48	0.57	0.31
100	0.70	0.25	0.45	0.16
1000	0.08	0.009	0.06	0.009

2.6 THE PROPOSAL'S USE OF OUTDOOR CONCENTRATIONS FOR CHRONIC EXPOSURE STUDIES DOES NOT ACCOUNT FOR THE FACT INDIVIDUALS SPEND 90% OF THEIR TIME INDOORS AND AN OUTDOOR CONCENTRATION'S PENETRATION INDOORS IS AS LOW AS 10%.

The Proposal assumes that exposed members of the public remain in the outdoor air for 24 hours per day. The Proposal does not cite any data to support this assumption. It is another conservative assumption.

Common experience suggests the public spends a significant portion of time indoors. EPA and the United States Consumer Product Safety Commission (1995) report people spend about 90% of their time indoors. A significant proportion of this indoor time is spent within the home. Common experience also suggests that some groups, such as pre-school children, students, the elderly, and nonworking adults may spend even more time indoors at school and/or home. The Proposal does not consider this circumstance when attempting to predict whether emissions will result in adverse effects.

A brief literature search to determine the degree to which outdoor air quality affects indoor air quality revealed the following information. Measurements of particle concentrations made for 2-week periods in 294 homes in seven U.S. cities identified 48% as the average outdoor particle concentration penetration indoors (Wallace et al, 2003). Daily ozone concentrations outdoors in a State College, PA study (Liu et al., 1993) were two times greater than indoors. This equals a penetration rate of 50%, assuming no sources of ozone inside the home. Analysis of a four-day plot of reactive ammonium nitrate concentrations (Lawerence Berkeley National Laboratory, 2003) shows the measured indoor concentration was about 10% of that outdoors (**Figure 2-1**). Ammonium nitrate is a chemically active species that exists in equilibrium with gaseous nitric acid and ammonia. So, Weston's proposed use of outdoor concentrations would overpredict indoor particle and ozone and ammonium nitrate concentrations by factors of approximately 2 and 10. These findings indicate that use of a 24-hour outdoor air exposure scenario to represent public exposure to HAPs adds yet another level of conservatism.

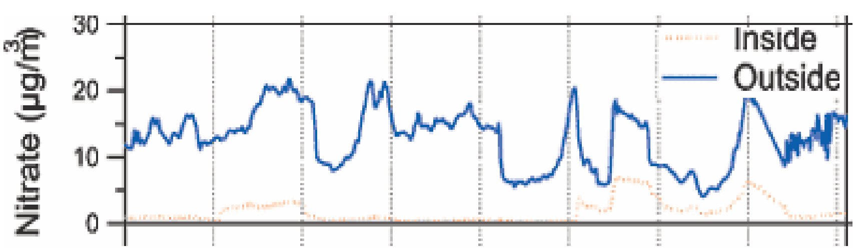

Figure 2-1. Variation in indoor (dotted line) and outdoor (solid line) ammonium nitrate concentration during a December intensive.

2.7 THE PROPOSAL DOES NOT FOLLOW EPA GUIDANCE FOR DETERMINING THE LOCATION OF THE PUBLIC AIR SPACE (I.E., "AMBIENT AIR").

The Proposal states that HAP modeling procedures will follow EPA guidance. (Proposal, p. 3). However, the Proposal makes an exception for determining the location where the public is exposed to air emissions, otherwise known as the "ambient air."

EPA (1986) says "[l]et me assure you there is no change in our long-standing national policy with regard to the definition of ambient air. That policy is based on 40 CFR Part 50.1 (e) which defines ambient air as '. . . that portion of the atmosphere, external to buildings, to which the general public has access.' A letter dated December 19, 1980, from Douglas Costle to Senator Jennings Randolph, reaffirmed and clarified this definition by stating the exemption from ambient air is available only for the atmosphere over land owned or controlled by the source and to which public access is precluded by a fence or other physical barriers." EPA (1985) further explains "[s]pecifically, for stationary source modeling, receptors should be placed anywhere outside inaccessible plant property."

In contrast, the Proposal explains that it uses the "process area boundary" (PAB) as the location of public exposure (ambient air). Proposal, p.4. At the August 10, 2005 stakeholder meeting where Weston explained its approach, Mr. Steve Mauch of Weston acknowledged that the approach is not used by EPA or most states, and "is relatively unique to Arizona."

It is not within the scope of this Report to address whether ADEQ's PAB policy is legally authorized. The fact that it is *different* and *more stringent* than the way EPA and most states determine the location of public exposure (ambient air) is enough to demonstrate that it adds yet another layer of conservatism to the Proposal. This conservatism is compounded for those source categories for which ADEQ has not gathered source specific information, because the Proposal will assume a hypothetical PAB of 25 meters for all such source categories. Proposal, p. 4.

2.8 THE EPA SCREEN3 MODEL USES RURAL DISPERSION COEFFICIENTS THAT RESULT IN EXCESSIVELY CONSERVATIVE (200%) CONCENTRATIONS IN URBAN AREAS

Weston proposes the conservative EPA SCREEN3 model with rural dispersion coefficients to estimate outdoor concentrations even in urban areas. At the stakeholder meeting on August 10, 2005, Weston representatives said that most HAP sources in Arizona are in rural areas and that there overall is not a large difference in predictions when using rural or urban dispersion coefficients.

To analyze this claim, modeling was conducted using rural and urban dispersion coefficients. **Table 2-1** lists the maximum 1-hour HAP concentrations predicted by SCREEN3 and ISCST3 for rural and urban dispersion coefficients at 25-m. The Proposal's default generic source was used. The Proposal's recommended use of SCREEN3 with rural dispersion coefficients at 25-m exceeds by a factor of 2 (200%) the ISCST3 prediction with urban dispersion coefficients. Based on this analysis, using the rural dispersion coefficient generally results in a significant overprediction of actual air quality impacts.

At the August 10 stakeholders meeting, Weston representatives also stated that it generally is very difficult to show an urban land use that warrants use of the urban dispersion coefficient. However EPA guidance says (40 CFR Ch. I (7–1–03 Edition), p. 471): "The selection of either rural or urban dispersion coefficients in a specific application should follow one of the procedures suggested by Irwin[80] and briefly described in paragraphs (c)–(f) of this subsection. These include a land use classification procedure or a population based procedure to determine whether the character of an area is primarily urban or rural. c. Land Use Procedure: (1) Classify the land use within the total area, A_o, circumscribed by a 3-km radius circle about the source using the meteorological land use typing scheme proposed by Auer[81]; (2) if land use types I1, I2, C1, R2, and R3 account for 50 percent or more of A_o, use urban dispersion coefficients; otherwise, use appropriate rural dispersion coefficients." It is unclear why it generally would be difficult to show an urban land use under this guidance.

2.9 THE LOW-LEVEL GENERIC VOLUME SOURCE RELEASE HEIGHT OVERSTATES BY 500% TO 800% THE OUTDOOR CONCENTRATION EFFECT OF HIGH STACK RELEASES

Weston proposes that ADEQ will review source-specific topographical maps, aerial photographs, or other mapping to identify dimensions to use for modeling the source. The Proposal states (Proposal, p. 2-3): "If no emission point data can be found, then a generic volume source will be used to represent the HAP emissions." Based on statements at stakeholder meetings, ADEQ has not provided Weston this source-specific information for various categories, suggesting that ADEQ may not have such data. If this is so, then the hypothetical low-level volume source description will be used for various source categories. This hypothetical low-level volume source is a 2-story (24-foot high, 100-foot long) building. For this low-level hypothetical source, the HAP emission release height is 12 feet (3.66 m), σ_{yo} is 23.4 feet (100/4.3 or 7.1 m) and σ_{zo} is 11.2 feet (24/2.15 or 3.4 m).

EPA modelers agree that release height is important (EPA, 2005d), so it seems inappropriate to analyze various Arizona HAP emissions with a hypothetical or default assumption of a low-level 12 foot release height. In fact, ground-level concentrations are 500% to 800% more with low-level emissions (Gifford and Hanna, 1973; Hanna et al., 1982). Emission releases from high stacks have more air to pass through on their way to the ground than emissions released at ground-level. A multiple of 5 to 8 reflects the conservatism imposed when HAP source releases from elevated stacks are described by the Proposal's hypothetical low-level source.

2.10 IF THERE ARE MULTIPLE SOURCES AT A FACILITY, THE PROPOSAL CONSERVATIVELY AGGREGATES THE WORST CASE OUTDOOR CONCENTRATION FROM EACH SOURCE. THIS OVERESTIMATES BY 283% THE ISC3 PREDICTED CONCENTRATION FROM THREE SOURCES WITH A REASONABLE DISTANCE BETWEEN THEM.

The Proposal states that for a facility with multiple emission points, the maximum impact of each stack will be aggregated for comparison to the presumed adverse effect levels. The potential conservatism in this approach studied by considering a facility with a 100-m length fence with three HAP point sources separated by a reasonable distance and each located 25-m from ambient air (**Figure 2-2**), and each stack having identical HAP emission rates.

The SCREEN3 concentration prediction at 25-m from each source is 1 $\mu g/m^3$. Weston proposes to aggregate these worst case concentrations, which would produce 3 $\mu g/m^3$ as the maximum total predicted HAP concentration from this three source facility in this example. For comparison, ISCST3 predicts a 1-hour maximum concentration of 1.06 $\mu g/m^3$ as the combined impact from these three sources, which is 283% lower. This multiple of 2.8 reflects the conservatism imposed by the Proposal's hypothetical assumption.

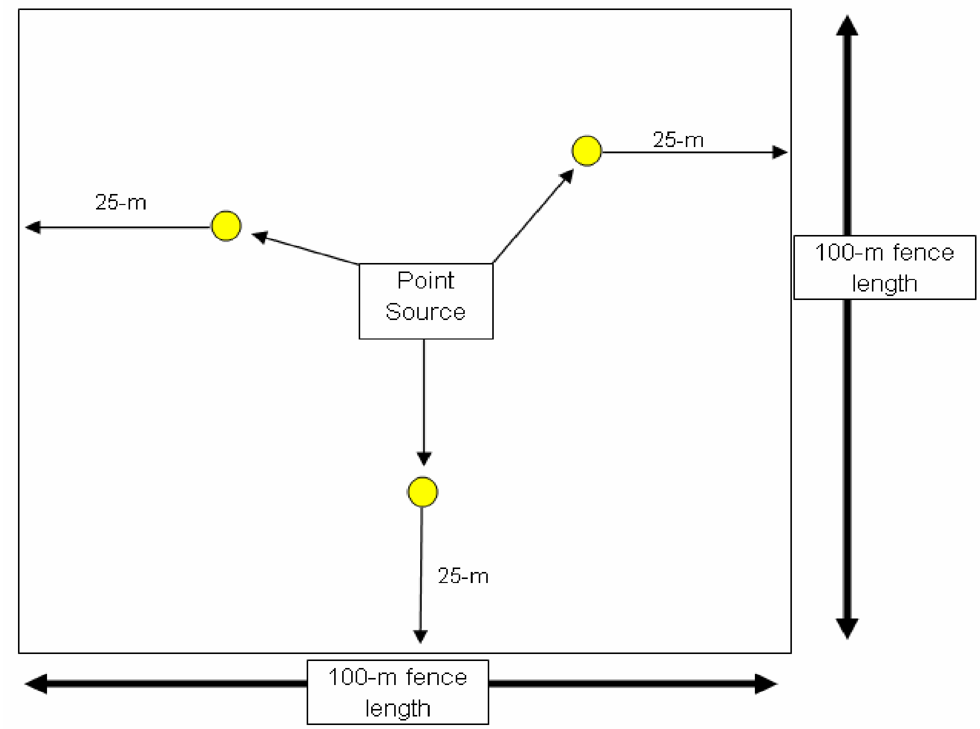

Figure 2-2. Facility with a 100-m length fence incorporating three HAP point sources each 25-m from ambient air

2.11 NO MENTION IS MADE OF HOW CAVITY ZONE CONCENTRATIONS ARE CALCULATED

The Proposal states that SCREEN3 will be used to calculate outdoor concentrations in the cavity zone of buildings. However, the SCREEN3 building effects model gives conservative (overestimated) concentrations for screening purposes (Cambridge Environmental Research Consultants, 2000). So, the SCREEN3 cavity zone model is not suitable for an estimate of actual HAP exposure. Moreover, no mention of how building data will be collected or applied is presented. A default procedure that uses a hypothetical cavity concentration could add more conservatism to the Proposal.

2.12 THE PROPOSAL'S OVERPREDICTION OF ACTUAL HAP IMPACTS IS COMPOUNDED BY RELIANCE ON OTHER ASSUMPTIONS AND HYPOTHETICALS.

The conservatism and concerns discussed in the foregoing comments illustrate a fundamental concern with the Proposal, and why it is not suitable for making a finding that emissions from a source or source category "results in" adverse effects. There are additional examples of the Proposal's reliance on assumptions and hypotheticals, rather than real-world data for sources. These include the following:

1. The Proposal (p. 4) states, "[o]ften times, the process area boundary is irregular in size and shape. In these cases, the closest boundary area to the stack will be selected." This method inappropriately uses the overall closest boundary distance as the closest receptor distance in all directions, even though the actual closest distance in most directions will be larger.
2. The Proposal (p. 4) states, "[a]ll sources will be evaluated at a unit emission rate of 1 gram per second (g/s)." Inaccurate outdoor concentration predictions will result for reactive HAPs with other than a concentration dependent transformation rate.
3. The Proposal (p. 5) states, "[i]f it cannot be determined which stack emits which pollutant, then a representative point will be selected using conservative objective criteria." This repeated application of conservatism upon conservatism yields unrealistic outdoor air concentrations.

3. PRACTICAL IMPLICATIONS

Virtually each individual concern identified in this Report is sufficient, by itself, to preclude the ADEQ Director from using the Proposal to make a scientifically valid finding that a source category "results in" adverse effects. When the effects of these multiple conservative features in the Proposal are combined, the problem is significantly compounded. This result is illustrated by Figure 1-1 presented in the Introduction to this Report and repeated below as **Figure 3-1**. **Figure 3-1** illustrates that the combined effect of the various conservative elements discussed in Section 2 of this Report will significantly overpredict actual exposure. By multiplying together the conservatism in the issues studied, the Proposal is shown to potentially overpredict from 1,000 to 60,000 times the actual human exposure for some HAP sources.

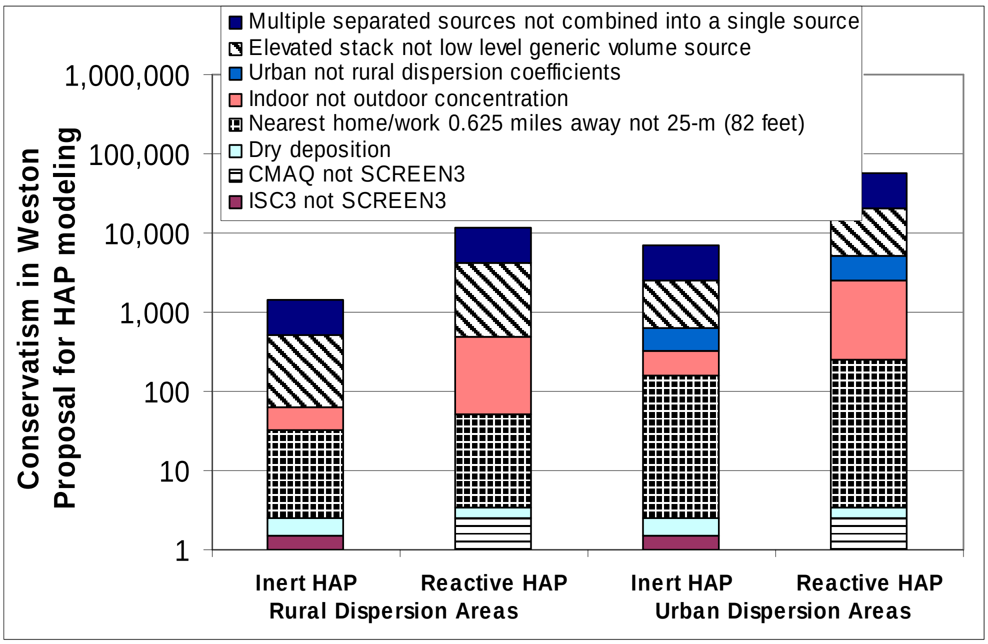

Figure 3-1. Estimated conservatism in Proposal modeling method.

This excessive conservatism also can be illustrated by using the commonplace example of benzene emissions from a large gasoline station. Actual benzene emissions were assumed to be 0.29 t/y, as reported from a large Denver gas station (Hancock III, 1993). Based on the methodology in the Proposal, this benzene emission rate would expose humans to an 84 $\mu g/m^3$ maximum annual average benzene concentration at 25-m. This predicted impact for a single gas station's impact on the public air in Phoenix is over 300 times Weston's proposed adverse chronic health effect level of 0.243 $\mu g/m^3$ for benzene. In other words, application of the Proposal suggest that the human cancer risk from a single gas station as 300 in 1 million. This exceeds estimates of a combined cancer risk for South Phoenix residents of 100 in 1 million (EPA, 2005e). Arizona HAP studies (EPA, 2005e) attribute this risk to broadly distributed on-road mobile sources and industrial emissions in South Phoenix. These comparisons highlight the over conservative nature of the Proposal.

Similarly, according to ADEQ's actual ambient air measurements in 1995, the average concentration of benzene in the Phoenix urban air was only 8.0 µg/m3 -- ten times less than the

84 µg/m^3 concentration predicted by the Proposal for a single gas station. ADEQ, "Arizona Hazardous Air Pollutant Research Program," Vol. 2, p. 3-14 (Dec. 1995). ADEQ's measured concentration reflected actual benzene impacts from multiple benzene sources (including vehicle exhaust from Phoenix traffic). The contrast between ADEQ's *measured* benzene concentration resulting from *multiple* urban sources (8.0 µg/m^3) and the benzene concentration *estimated* using the Proposal's formula for a *single* large gas station source (84 µg/m3) is dramatic and illustrates the overly conservative nature of the Proposal.

4. CONCLUSION

Based on multiple conservative assumptions and features, the Proposal will seriously overpredict the HAP impact of a source or source category on the ambient air. For that reason, it would not provide a scientifically valid basis for a finding by the ADEQ Director that emissions from a source or source category "result in" adverse effects to human health or the environment.

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APPENDIX A

AUTHOR CREDENTIALS

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Experience:

Over the past 15 years, Dr. Ryan has modeled PSD, NAAQS, and haze compliance of mines, cement, smelters, power plants, crushing and screening, and hot mix asphalt emissions in Arizona, California, New Mexico, other western States and nationwide.

Dr. Ryan helped develop a site-specific dispersion model for use around a facility. By showing this site-specific model was more accurate than EPA regulatory models, EPA agreed to its use for the facility.

He responded to a facility request for demonstrating PM_{10} NAAQS compliance. The demonstration reduced levels of conservatism in the ADEQ early report.

Dr. Ryan was hired by the U.S. Department of Justice to estimate emission benefits from EPA moving to 2002 from 2007 a heavy-duty diesel truck emission regulation. He responded to criticism's leveled by industry consultants that emission benefits of the rule were insignificant.

He has compiled many fugitive dust emission inventories. He has estimated the effectiveness of fugitive controls. He has determined Best Available Control Technology (BACT) for a power plant, crushing and screening plants, and VOC emitting plant.

Education:

Ph.D. Chemical Engineering, University of California, Los Angeles, 1990
Minors in Mathematics and Numerical Simulation
Thesis: *Theoretical Studies of Mass Transport in the Unsaturated Soil Zone.*

M.S. Chemical Engineering, University of California, Los Angeles, 1986
Thesis: *Multimedia Modeling of Environmental Transport.*
B.S. Engineering, University of California, Los Angeles, 1983

Outstanding Ph.D. Award, UCLA School of Engineering, 1988-1989

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